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Impact of different tree species and soil texture on physicochemical properties, carbon and macronutrient content of post-fire forest soils

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The objective of this study was to compare the impact of Scots pine (*Pinus sylvestris* L.), European larch (*Larix decidua* Mill.) and common birch (*Betula pendula* Roth) on the properties of regenerated soils in a reforested post-fire site in southern Poland (Central European conditions). The samples of O horizons (litter) and uppermost mineral soil (0-5 cm) were taken under pure stands of investigated tree species, aged from 26 to 27 years old and growing on sandy and loamy soils. In the litter samples, the pH, carbon and macronutrient (N, Ca, Mg and K) content were determined. The mineral soil samples were measured for texture, pH, soil organic carbon (SOC), total nitrogen (N_t), exchangeable acidity (Hh), basic exchangeable cations (Ca²⁺, K⁺, Mg²⁺, Na⁺) and cation exchangeable capacity (CEC). The obtained results indicated that the effect of tree species on soil properties was evident. The litter layers under birch had a higher pH and a lower C:N ratio, and they contained more N, P, Ca, and Mg than the litter layers under pine and larch. In the mineral soil, birch brought about a higher accumulation of SOC and CEC than the studied coniferous species. Higher SOC accumulation in mineral soil under birch was related to higher acidity under the species compared with the conifers. Soil texture in the studied range - from sands to loams - had only a limited effect on the properties of the studied post-fire soils. Thus, our results indicate that the tree species used for the reforestation of post-fire sites are crucial to the properties of regenerating soils and restoring the ecological functions of soils. Among the studied tree species, the common birch has the most pronounced effect on soil properties, and this is especially significant because the species has appeared by spontaneous succession.

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